

ch 10 parametric equations

$$\begin{aligned} x &= f(t) \\ y &= g(t) \end{aligned} \quad \begin{aligned} &> \text{both functions of } t \\ &\text{t is a common parameter} \end{aligned}$$

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$$

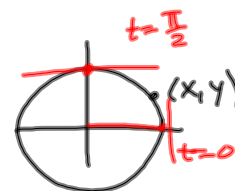
$$\begin{aligned} x &= t \\ y &= 100 - 9.8t^2 \\ \frac{dy}{dx} &= \frac{-2(9.8)t}{1} \end{aligned}$$

$$\begin{aligned} x &= \cos t \\ y &= \sin t \end{aligned}$$

$$\frac{dy}{dx} = \frac{\cos t}{-\sin t}$$

$$\frac{dy}{dx} \Big|_{t=\frac{\pi}{2}} = \frac{0}{-1} = 0$$

$$\frac{dy}{dx} \Big|_{t=0} = \frac{1}{0} \times$$



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$$\frac{d^2y}{dx^2} = \frac{\frac{d}{dt}\left(\frac{dy}{dx}\right)}{\frac{dx}{dt}}$$

$$x = \cos t \quad y = \sin t$$

$$\frac{dy}{dx} = \frac{\cos t}{-\sin t}$$

$$\frac{d^2y}{dx^2} = \frac{(-\sin t)(-\sin t)(\cos t)}{(-\sin t)^2}$$

$$\text{simplify } \frac{\sin^2 t \cos t}{-\sin^3 t} = -\frac{\cos t}{\sin t} = -\csc t$$

$$\frac{dx}{dt} = -\sin t$$

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